

WHAT IS CLAIMED IS:

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- 1 1. A method of manufacturing a trench field effect transistor on
- 2 a substrate having a first conductivity type, the method comprising the steps of:
- 3 forming a first trench extending into the substrate;
- 4 lining the first trench with dielectric material;
- 5 substantially filling the first trench with conductive material to form
- 6 a gate electrode of the field effect transistor;
- 7 forming a body region having a second conductivity type in the
- 8 substrate;
- 9 forming a source region having the first conductivity type inside the
- 10 body region and adjacent to the first trench;
- 11 forming a second trench adjacent to said source region and extending
- 12 into the body region below the source region; and
- 13 filling the second trench with high conductivity material for making
- 14 contact to the body region.

- 1 2. The method of claim 1 wherein the step of filling the second
- 2 trench with high conductivity material for making contact to the body region also
- 3 makes contact to the source region.

- 1 3. The method of claim 2 wherein the step of filling the second
- 2 trench with high conductivity material comprises a self-aligned masking step for
- 3 making contact with both the body region and the source region.

- 1 4. The method of claim 2 further comprising a step of
- 2 implanting impurities of the second conductivity type into the body region under
- 3 the second trench before the step of filling the second trench.

1 5. The method of claim 4 further comprising a step of heating
2 the substrate after the step of implanting to drive the impurities further into the
3 body region.

1 6. The method of claim 2 further comprising a step of forming a
2 thin layer of barrier metal between the high conductivity material and the body
3 region.

1 7. The method of claim 6 wherein the high conductivity material
2 comprises aluminum and the thin layer of barrier metal comprises titanium.

1 8. The method of claim 2 wherein the step of forming the second
2 trench comprises a step of etching silicon through the source and body regions.

1 9. The method of claim 2 wherein the second trench is shallower
2 than the first trench.

1 10. The method of claim 2 wherein the second trench is
2 approximately as deep as the first trench.

1 11. The method of claim 2 wherein the second trench is deeper
2 than the first trench.

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13. A process for manufacturing a trench field effect transistor comprising the steps of:

- etching a first trench in a substrate having a first conductivity type;
- lining the first trench with a layer of dielectric material;
- substantially filling the trench with polysilicon;
- implanting impurities of a second conductivity type into the substrate to form a body region having the second conductivity type over the substrate;
- implanting impurities of the first conductivity type inside the body region to form a source region adjacent to the first trench;
- etching a second trench through the source region and into the body region; and
- filling the second trench with metal making contact with both the source region and the body region.

1 15. The process of claim 13 wherein the step of etching the
2 second trench etches the second trench to a shallower depth than the first trench.

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1 17. The process of claim 13 wherein the step of etching the
2 second trench etches the second trench deeper than the first trench.

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1. The first step is to identify the problem. In this case, the problem is that the company is not meeting its sales targets.